

Appl. No. 10/089,121
Supplemental Amtd. Dated April 1, 2005
Response to Office Action of March 3, 2005

CUSTOMER NO. 28752

Listing of Claims:

Claims 1-56 (Cancelled).

Claim 57 (Previously Submitted) A mold in which a working temperature of all parts of the mold is kept within a small range of temperatures thereby to provide for reduced cycle times, which comprises an arrangement to assist in controlling of the temperature of the mold, including:

at least one closed chamber;

said chamber being only partially filled with the liquid and in a space above said liquid a remainder of the chamber being filled with substantially only the vapour of said liquid;

at least a portion of said chamber being positioned to transmit heat from a targeted location of the mold into said liquid within said chamber;

condensing means to effect condensation of said vapour within said chamber in response to heat exchange, and

enabling means to enable said liquid to be arranged, in use, to be distributed in said chamber in such a way that said liquid will be distributed to reach or be held at different heights within said chamber.

58. (Previously Presented) The mold as claimed in claim 57, including:

a passageway having an entry connecting with said liquid in said chamber and having a closed upper end of said passageway and being such that liquid height within the passageway is visible to an external viewer;

this arrangement being such that a level of the liquid within said passageway will change from a first level whereat a first evacuation status within said chamber exists to a second level forming a second evacuation status and the degree of evacuation within said chamber being less than said first evacuation status.

59. (Previously Presented) The mold as claimed in claim 57, wherein:

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said condensing means includes a shallow trough below a heat exchanger forming part of said condensing means maintained cool by cooling water passing through said heat exchanger for condensation of vapour rising in said chamber;

a percolator arrangement for feeding water into said trough, and a tube provided with an inlet at a bottom of said chamber for drawing liquid into said tube, said tube having an outlet for directing lifted water into said trough; and

said enabling means including heating means alongside of said tube for controlling the quantity of said liquid that can be lifted.

60. (Previously Presented) The mold as claimed in claim 59, including:

at least one needle injector comprising a second tube having its inlet associated with said trough for inserting said liquid running down through said second tube into a passage for squirting small quantities of said liquid for splashing and coating said inner surface of said passage.

61. (Previously Presented) The mold as claimed in claim 57, wherein said enabling means includes a plurality of cascading reservoirs fed by said liquid returning from said condensing means.

62. (Previously Presented) The mold as claimed in claim 57, including:

injector means positioned in said chamber;

said injector means including a passageway having an open top at one end and a mold part at its other end with water being fed to said mold part through said passageway;

said open top being at a height above said mold part such that any water in said passageway will be forced to a lowermost outlet of said mold;

said open top and boiling water results in water splashing into said open top and thereby feeding said passageway; and

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said condensing means being located in an area above a base level of any of said liquid.

63. (Previously Presented) The mold as claimed in Claim 57, wherein said enabling means includes a plurality of cascading reservoirs fed by said liquid returning from other lifted liquid as from a pump or a percolator.

64. (Previously Presented) A mold comprising an arrangement to assist in controlling of the mold temperature, including:

at least one closed chamber within said mold;

said chamber being filled with liquid and vapour of the liquid, said chamber being partially filled with the liquid and the remainder of said chamber being filled with substantially only the vapour of the liquid within said chamber;

at least a portion of said chamber being positioned to transmit heat from a targeted location of the mold into the liquid within said chamber;

condensing means for effecting condensation of the vapour within said chamber, said condensation of the vapour within said chamber being effected by heat exchange; and

means for distribution of the liquid in the chamber to reach or be held at different heights within said chamber such that the liquid is arranged, in use, to be distributed in the chamber in such a way that the liquid will be distributed to reach or be held at different heights within the chamber.

65. (Previously Presented) A mold as claimed in claim 64, wherein said distribution means includes at least one reservoir for achieving the different heights of the liquid within said chamber to maintain a bottom of said reservoir above a bottom of said chamber.

66. (Previously Presented) A mold as claimed in claim 64 or 65, including means for applying the liquid as a surface application onto an inner surface of said

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chamber and above a base level of the liquid within said chamber to achieve the different heights of the liquid within said chamber.

67. (Previously Presented) A mold as claimed in claim 64, including a passageway for achieving the different heights and with some of the liquid in the passageway, and an inlet to said passageway located above a base upper level of the liquid in said chamber.

68. (Previously Presented) A mold as claimed in claim 64, including an additive to effect foaming for achieving the different heights.

69. (Previously Presented) A mold as claimed in claim 64, wherein the liquid includes a foaming agent.

70. (Previously Presented) A mold as claimed in either of claims 64 or 65, wherein the liquid is predominantly water and to form a foaming agent.

71. (Previously Presented) A mold as claimed in claim 58 or 59, including:

a passageway;

said chamber including a passage for receiving liquid through said passageway from a main body of liquid;

said passage having dimensions such that surface tension of the liquid received from said passageway inhibits passage of liquid into said chamber and said passageway which supplies said liquid from the main body of liquid enters said chamber through said passage; and

at least one reservoir for holding liquid in said chamber being associated with said chamber so that the liquid held in said chamber provides a head of liquid in said reservoir which is less than the height of the liquid above other liquid in said chamber.

72. (Previously Presented) A mold as claimed in claim 64 or 65, including a substantially vertical conduit provided with a lower inlet and an upper outlet, a heat source adjacent to a part of said conduit, and means for holding any liquid lifted through

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said conduit in response to boiling of liquid effecting a percolator type effect, to a height above a normally existing upper level of liquid in said chamber.

73. (Previously Presented) A mold as claimed in claim 72, including means for gathering liquid within said chamber at a height higher than an entry position into a conduit shape and means for effecting a supply of such liquid through an injected conduit into said conduit shape.

74. (Previously Presented) A mold as claimed in claim 64 or 65, wherein said chamber has an area providing for condensing of any vapour within said chamber, and including a reservoir beneath said area and a conduit extending from said reservoir down into an injector conduit, said injector conduit including an aperture through which the liquid will flow at a rate controlled by the head of liquid and the size of the conduit.

75. (Previously Presented) A mold as claimed in claim 64 or 65, including:
a conduit forming part of said closed chamber, said closed chamber having an inlet at a lower position within said chamber such that said inlet will be below a normal liquid level within said chamber, said chamber including an upper outlet for directing liquid into a holding reservoir; and

heat means to provide a source of heat in an adjacent vicinity to said conduit.

76. (Previously Presented) A mold as claimed in 64 including at least one vessel comprising a dam or reservoir for holding a limited amount of the liquid and for collecting the liquid from time to time during the boiling of the liquid in the chamber either in response to rapid transition to vapour effects causing substantially ebullition and therefore implicit lifting of the liquid to appropriate heights, or in response to condensate being directed to said at least one vessel; and

where there is more than one of said vessels, said vessels being positioned one above the other, means to position the more than one of said vessels to enable them to overflow while being filled with the liquid such that a cascading effect from the one of

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said vessels above the other of said vessels can ensure that each of the more than one said vessel is kept to only a selected level and head pressure and thereby maintaining a reasonably small range of temperatures at which the liquid both at its top and bottom depth will boil within that selected vessel.

77. (Previously Presented) The mold as claimed in claim 57, including:

a conduit as part of said closed chamber, said conduit having an inlet at a lower position within said closed chamber, and said inlet being below a normal liquid level);

said chamber having an upper outlet for directing liquid into a holding reservoir for feeding conduits to feed injector conduits; and

the heat transmitted from the targeted location of the mold supplies heat to any material within said vertical conduit.

78. (Previously Presented) A mold as claimed in claim 64, including flock in the form of a number of short strands of fiber attached end on in close vicinity one to the other, to the surface of the chamber forming a flock applied surface so that liquid which reaches the flock applied surface will be held to be of greater depth and therefore act as a greater reserve.

79. (Previously Presented) A mold as claimed in claim 57, wherein the liquid is water.

80. (Previously Presented) A mold as claimed in claim 57, including a foaming agent in the form of a foam causing surfactant.

81. (Previously Presented) A mold as claimed in claim 64, including a foam causing film of the liquid to pass across the selected surface area for wetting thereof to effect replenishment.

82. (Previously Presented) A mold as claimed in claim 64, including a passageway having one entry connecting with liquid in the chamber an upper closed end, said passageway having at least a portion which can be seen through to the extent that

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any liquid level within the passageway can be externally determined and the position of the passageway including said entry end and said closed upper end, is such that a level of liquid within the passageway will change from a first level where a first evacuation status within the chamber exists, to a second level where the degree of evacuation within the chamber is less than the first said evacuation status.

83. (Previously Presented) A method of effecting heat transfer within a closed chamber of a mold for injection molding of plastic materials including providing within the closed chamber only liquid and a vapour of the liquid within a space above the liquid within the chamber, and extracting heat from the chamber from a surface of the chamber a level of the liquid within the chamber and where the liquid level is at different heights within the chamber whereby to provide for the exclusion of air or a reduction in the chamber to merely the vapour of the liquid within the chamber.

84. (Previously Presented) A method of effecting heat transfer within a closed chamber of a mold for effectively eliminating air or a reduction in the chamber of vapour of the liquid within the chamber wherein having within the closed chamber only liquid and the vapour of the liquid within a space above the liquid within the chamber, including selecting a surface of the chamber for purposes of extracting heat therefrom above a level of the liquid within the chamber and effecting replenishment of liquid in respect of that selected area from time to time where the selected area includes a treatment to effect retention of the liquid by use of surface tension of the liquid to assist in keeping more uniform temperatures in the mold for injection molding of plastic materials.

85. (Previously Presented) The mold as claimed in claim 57, wherein said enabling means to enable said liquid to reach or be held at different heights within the chamber has a bottom and includes at least one reservoir within said chamber having a bottom of said reservoir above said chamber bottom.

86. (Previously Presented) The mold as claimed in claim 57, wherein said enabling means to enable said liquid to reach or be held at different heights within the

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chamber includes said surface material coated onto said inner surface above a base level of said liquid within said chamber.

87. (Previously Presented) The mold as claimed in claim 57, wherein said condensing means include a shallow trough below a heat exchanger forming part of said condensing means maintained cool by cooling water passing through said heat exchanger for condensation of vapour rising in said chamber; and

said enabling means including heating means alongside of said tube for controlling the quantity of said liquid that can be lifted.

88. (Previously Presented) The mold as claimed in claim 57, wherein said enabling means includes a liquid capable of foaming during use of said mold, and said liquid when boiling results in said liquid rising as said foam containing said vapour of said liquid extends said liquid as a film through said chamber, thereby providing for a reduction in the quantity of water necessary for holding a uniform temperature within the mold.